



TEACHER GUIDE

COMPOSING & DECOMPOSING NUMBERS (1-10) GRADES K-2

COMMON MISCONCEPTIONS

- **A number cannot be broken into smaller parts.**

Students have been working hard on learning that when counting, the next number said is adding 1 more, and the last number said is the total number of items counted. This has developed their understanding of the concept of the whole, but now students need to see that these totals can also be broken down into two smaller groups. They will begin to see that 7 is not just 7; 7 can be 3 blue counters and 4 red counters, or 3 triangles and 4 squares. The understanding that totals can be composed of two smaller groups will lead into addition and subtraction skills, as adding is combining two groups to make a new total and subtracting is taking a whole and breaking it into two smaller groups.

- **There is only one way to compose/decompose a number.**

Students may initially think that numbers can only be composed/decomposed in one way. Students have been counting objects to get totals, but they haven't really been looking at the parts, because usually the counting objects were all the same and students counted just to find the total. Gaining the understanding that wholes can be made up of parts leads very nicely into the concepts of addition and subtraction. Understanding that 7 can be made of many parts, such as 0 and 7, 1 and 6, 2 and 5, 3 and 4, 5 and 2, 6 and 1, and 7 and 0, helps students develop a broader understanding of number sense and of the operations of joining and separating.

- **You cannot find a missing part of a whole.**

Students may struggle with being able to find a missing "part" when one part and the total is known. Students may feel that the only way to compose/decompose is by knowing the parts to count the total. As students gain more confidence with understanding how the parts and the whole are related, they will see that they can count up or count back to find a missing part. This skill also lends itself to addition and subtraction in the future.

COUNTING IS THE BASIS OF COMPOSING AND DECOMPOSING NUMBERS

As students count numbers of objects, they are experiencing basic composing of numbers. For example, as students count 7 objects by counting up to 7, they are composing new numbers with 1. Counting objects in a group is usually done by counting in order, by ones, to find the total. If students have counted 5 out of 7 objects, the process of counting is as follows: 5 (and 1 more makes) 6, 6 (and 1 more makes) 7. Although they don't state this process, students are composing as they count. They could write the two numbers as they progressed if it were needed. Similarly, counting backwards is decomposing by 1 as they count back: 7 (and 1 less is) 6, 6 (and 1 less is) 5, etc.

DECOMPOSING NUMBERS IS A FOUNDATION FOR SUBTRACTION

As students decompose numbers, they are building a foundation for subtraction. They are taking a greater whole number and breaking it into two lesser whole numbers. When given manipulatives to use when decomposing, they will see the various ways a number can be “made.” Understanding that numbers can be made of many different combinations of lesser numbers helps to deepen students’ understanding of numbers and counting. As this number sense develops, students can begin to connect decomposing with subtraction in future lessons, and then symbols will come into play. While decomposing, no symbols are used; students are just breaking apart a whole number into two parts.

COMPOSING NUMBERS IS A FOUNDATION FOR ADDITION

As students compose numbers, they are building the foundation for addition. They are joining two numbers to make a greater number. For now, the focus should be on making sure students understand that two lesser numbers can be combined to make a greater whole number. Starting with manipulatives and a set number for the “whole,” students can begin to compose the whole using the lesser numbers. Students will be able to see that whole numbers can be made from many combinations of lesser numbers. For example, 8 can be made from 1 and 7 or 7 and 1; 6 and 2 or 2 and 6; 3 and 5 or 5 and 3; 4 and 4; and 8 and 0 or 0 and 8. Although this is set up like early addition, no symbols are used; manipulatives, drawings, and number bonds are tools used to help students develop the concept.

TEACHER TIPS

Provide students with many opportunities to compose/decompose numbers. This is valuable experience that helps students develop concept understanding that they will need when they start learning addition and subtraction. Seeing the many ways that whole numbers can be composed is good reinforcement for students to realize a number can be a total of two parts.

Students can move from concrete objects to recording sheets that have a total and spaces where students can color two parts to show numerous ways to make the given total. For example, a recording sheet could have rows containing the number 8 at the left and then 8 circles. The circles can be colored to show various ways to compose 8. These can be translated to number bonds and then addition sentences. This experience helps students see part-part-whole situations and lets them count the parts to get to the whole.

Switching the location of the total (8) is also beneficial so that students get accustomed to seeing equations written as $3 + 5 = 8$ and as $8 = 3 + 5$. Having the total to the left gives students more of a whole-part-part situation, and will allow them to see the total, a colored part, and the part that is left to make the total: $8 = 3$ shaded + 5 unshaded.